

CLAIMS

WHAT IS CLAIMED IS:

- 1        1. A device comprising:
  - 2                an opto-electronic circuit fabricated a first substrate having conductive
  - 3                surfaces; and
  - 4                a package substrate coupled to the opto-electronic circuit at the conductive
  - 5                surfaces via solder bumps.
- 1        2. The device of claim 1, wherein the opto-electronic circuit further comprises:
  - 2                at least two planar waveguides; and
  - 3                a heating element coupled to at least one of the two planar waveguides, the
  - 4                heating element coupled to the package substrate via the solder bumps.
- 1        3. The device of claim 2 further comprising:
  - 2                a conductive strip on the package substrate coupling the heating element to
  - 3                the package substrate.
- 1        4. The device of claim 3 further comprising:
  - 2                a conductive pad on a side of the package substrate opposite the conductive
  - 3                strip, the conductive pad coupled to the conductive strip through a via,
  - 4                the conductive pad used to surface mount the package substrate.

- 1       5. The device of claim 2, wherein the package substrate comprises ceramic.
- 1       6. The device of claim 2, wherein the heating element is coupled to the package  
2       substrate at a first node and a second node of the package substrate.
- 1       7. The device of claim 6 further comprising:  
2            a conductive strip attached to the first node and the second node of the  
3            package substrate.
- 1       8. A method of making an opto-electronic device comprising:  
2            aligning an opto-electronic circuit having a first plurality of electrical  
3            contacts to a package substrate having a corresponding second plurality  
4            of electrical contacts; and  
5            bonding the opto-electronic circuit to the package substrate using solder  
6            bumps.
- 1       9. The method of claim 8, wherein aligning the opto-electronic circuit further  
2       comprises:  
3            aligning a heating element of a thermo-optic switch with conductive strips of  
4            the package substrate.
- 1       10. The method of claim 9, wherein bonding the opto-electronic circuit to the  
2       package substrate further comprises:

3 bonding the heating element of the thermo-optic switch to the conductive  
4 strips of the package substrate using solder bumps.

1 11. A method of operating a thermo-optic switch having a heating element, the  
2 method comprising:

3 providing an electric current to the heating element through a first and  
4 second solder bump nodes coupling the heating element to a package  
5 substrate; and  
6 causing an optical signal to change direction due to heating of the heating  
7 element caused by the electric current.

1 12. The method of claim 11, wherein the electric current is provided to the  
2 package substrate through surface mounted leads.

1 13. The method of claim 12 further comprising:  
2 controlling the electric current by an electrical controller surface mounted to  
3 a circuit board common with the package substrate.

1 14. The method of claim 12 further comprising:  
2 controlling the electric current by an electrical controller mounted on the  
3 package substrate.

1 15. A system comprising:  
2 a thermo-optic switch surface mounted to a circuit board; and

3                   an electrical controller surface mounted to the circuit board, the electrical  
4                   controller providing electrical signals to the thermo-optic switch  
5                   through the circuit board.

1         16. The system of claim 15, wherein the thermo-optic switch further comprises:  
2                   a first substrate having a heating element;  
3                   a second substrate, the heating element coupled to the second substrate via  
4                   solder bumps.

1         17. The system of claim 16, wherein the thermo-optic switch further comprises:  
2                   a waveguide in close proximity to the heating element, the waveguide  
3                   comprising a thermally sensitive material.

1         18. The system of claim 17, wherein the waveguide comprises silica on silicon.